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is sufficient to entitle them to the lasting gratitude of our profession. It was one of the merits of that illustrious physician of our own time and country, Dr. Rush, that he seized with avidity every fact, from whatever quarter it might be drawn, to elucidate his favourite science. If ever medicine shall attain to the elevation of a truly *philosophical science*, it must be accomplished, in part at least, by imitating his example, and by developing the infinite and diversified associations which exist between it and the other sciences.

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ART. XIV. *Thoughts on Atmospheric Dust.* By C. S. RAFINESQUE, Esq.

1. "WHEN we find the ruins of ancient cities buried under ground; when the plough uncovers the front of palaces and the summit of old temples, we are astonished: but we seldom reflect why they are hidden in the earth. A sort of imperceptible dust falls at all times from the atmosphere, and it has covered them during ages."

2. These are the words of the worthy and eloquent philosopher VIREY, in his article *Nature*, Vol. XV. p. 373, of the French Dictionary of Natural History. Even before reading them I had observed the same phenomenon, and I have since studied their effects in various places. I could quote one thousand instances of the extensive and multifarious operations of this meteoric dust: but I mean to give the results merely of those that fall daily under notice, and are yet totally neglected; wishing to draw on them the attention of chemists, philosophers, and geologists.

3. Whenever the sun shines in a dark room, its beams display a crowd of lucid dusty molecules of various shapes, which were before invisible as the air in which they swim, but did exist nevertheless. These form the atmospheric dust; existing every where in the lower strata of our atmosphere. I have observed it on the top of the highest moun-

tains, on Mount Etna, in Sicily, on the Alps, on the Alleghany and Catskill mountains in America, &c. and on the ocean.

4. It deserves to be considered under many views : which are its invisibility, its shape and size, its formation and origin, its motion, its deposition and accumulation, its composition, its uses, and its properties.

5. This dust is invisible, owing to the tenuity of its particles, but they become visible in the following instances ; when the sun shines on them, since they reflect the light, when their size is increased, and when they are accumulated any where.

6. The size of the particles is very unequal, and their shape dissimilar ; the greatest portion are exceedingly small, similar to a whitish or grayish spark, without any determinable or perceptible shape ; the larger particles are commonly lamellar or flattened, but with an irregular margin, and the largest appear to be lengthened or filiform ; the gray colour prevails. Other shapes are now and then perceptible with the microscope.

7. Among the properties of atmospheric dust are those of being soft, as light as atmospheric air, of reflecting the rays received directly from the sun, of possessing a kind of peculiar electricity, which gives it a tendency to accumulate on some bodies more readily than on some others, and of forming an earthy sediment, which does not become effervescent with acids.

8. This dust is either constantly or periodically formed, but chemically in the atmosphere like snow, hail, meteoric stones, honey-dew, earthy rains, &c. by the combination of gaseous and elementary particles dissolved in the air. Its analysis has never been attempted by chemists ; but the earthy sediment which is the result of its accumulated deposition, proves that it is a compound of earthy particles in a peculiar state of aggregation, and in which alumine appears to preponderate, rather than calcareous or silicious earths or oxides.

9. Its motion in calm weather, or in a quiet room, is very slow ; the particles appear to float in the air in all directions, some rising, some falling, and many swimming horizontally, or

forming a variety of curved lines ; what is most singular, is that no two particles appear to have exactly the same direction ; yet after awhile the greatest proportion fall down obliquely, somewhat in the same manner as a light snow in a calm day. When a current of air is created naturally or artificially in the open air or in a room, you perceive at once an increased velocity in their motion ; they move with rapidity in all directions ; but when a strong current or wind prevails, they are carried with it in a stream, preserving however, as yet, their irregular up and down motion.

10. Its formation is sometimes very rapid, and its accumulation very thick in the lower strata of our atmosphere, but the intensity is variable. Whenever rain or snow falls, this dust is precipitated on the ground by it, whence arises the purity of the air after rain and snow ; but a small share is still left, or soon after formed. In common weather it deposits itself on the ground by slow degrees, and the same in closed rooms. It forms then the dust of our floors, the mould of our roofs, and ultimately the surface of our soil, unless driven by winds from one place to another.

11. I have measured its accumulation in a quiet room, and have found it variable from one-fourth of an inch to one inch in the course of one year ; but it was then in a pulverulent fleecy state, and might be reduced by compression to one-third of its height, making the average of yearly deposit about one-sixth of an inch. In the open air this quantity must be still more variable, owing to the quantities carried by the winds and waters to the plains, valleys, rivers, the sea, &c. or accumulated in closed places or against walls, houses, &c. I calculate, however, that upon an average, from six to twelve inches are accumulated over the ground in one hundred years, where it mixes with the soil and organic exuvæ, to form the common mould.

12. The uses of this chronic meteor are many and obvious. It serves to create mould over rocks, to increase their decomposition, to add to our cultivable soil, to amalgamate the alluvial and organic deposits, to fertilize sandy and unfruitful tracts in the course of time, to administer to vegetable life, &c.





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It does not appear that it has any bad influence on men and animals breathing it along with air, unless it should be accumulated in a very intense degree.

13. At Segesta, in Sicily, are to be seen the ruins of an ancient temple ; the steps, which surround it on all sides below the pillars, are built on a rock, on the top of a hill detached from any other higher ground. Yet now all the steps and the base of the pillars are under the ground, which has accumulated from this dust and the decay of plants (not trees) to which it has afforded food. There are from five to eight feet from the rock to the surface of this new soil, which has chemically combined in a variety of hardness. This soil has arisen there in about 2000 years, notwithstanding the washings of rain. I quote this as a remarkable instance of the increase of soil by aerial deposits, among many which have fallen under my personal examination.

14. It is commonly believed that the dust of our rooms is produced by the fragments of decomposed vestments, beddings, furnitures, &c. ; this cause increases it, and produces a different dust, which mixes with the atmospheric dust ; but it is very far from producing it.

15. The dust of the open air is ascribed to that raised from roads and fields, by the pulverization of their surface ; but this secondary and visible dust is only a consequence of the first. From whence could arise the dust observed by the means of the sunbeams in a dark corner, in winter, when the ground is frozen, or when it is wet and muddy, or at sea, or on the top of rocky mountains ?

16. It is therefore a matter of fact, worth taking into consideration by geologists, that the air still deposits a quantity of dust, which must have been much greater in former periods. Just the same as the sea deposits still a quantity of earthy and saline particles dissolved in it, and which were superabundant at the period when the rocky strata were formed on its bottom. Water being more compact, deposits rocks. Air, which is less dense, deposits a pulverulent matter !

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